STANDOFF LAND-ATTACK MISSILE EXPANDED RESPONSE (SLAM-ER)

Navy ACAT II Program		**Prime Contractor**
Total Number of Systems:	700	Boeing
Total Program Cost (TY$):	$525M	
Average Unit Cost (TY$):	$450K	
Full-rate production:	3QFY00	

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

The Standoff Land-Attack Missile- Expanded Response (SLAM-ER) is a precision tactical weapon for deployment aboard aircraft carriers and is launched from an F/A-18 aircraft. SLAM-ER is designed to provide standoff precision strike against fixed, high value land targets; secondary targets include relocatable stationary land targets and ships. It should satisfy intermediate tactical needs between long-range cruise missiles and short-range free fall munitions. The improvements provided by SLAM-ER over its predecessor, SLAM, take advantage of new technological innovations to provide naval tactical aircraft with the tools required for ***precision engagement***. These improvements include: (1) longer range to increase survivability of launch and/or control aircraft; (2) reduced susceptibility to countermeasures; (3) other electro-optical seeker upgrades; (4) increased probability of kill against hardened targets for increased system lethality; (5) an improved guidance navigation unit with an

integrated Global Positioning System and Inertial Navigation System; and (6) improved user interfaces for mission planning and launch aircraft.

BACKGROUND INFORMATION

SLAM is a fielded system with proven combat performance in Operation Desert Storm and Bosnia, while SLAM-ER is intended to provide incremental improvements in range and penetrating lethality. SLAM-ER entered EMD after a Milestone IV/II decision in 2QFY95. In December 1996, the Assistant Secretary of the Navy (RDA) decided to procure the FY96 buy of SLAM in the SLAM-ER configuration avoiding $35 million in future retrofit costs. The LRIP 1 decision was made in April 1997 with LRIP 2 made in April 1998. These two production decisions totaled over 100 missiles. Milestone III and full-rate production decisions are planned for FY00; IOC is planned for CY00.

The LFT&E strategy in the 1996 OSD-approved TEMP specified three data sources for LFT&E: (1) confined volume testing at the Nevada Test Site (completed in early FY97); (2) three arena tests of warhead fragmentation (completed in FY98); and (3) four sled tests of warhead penetration (completed in FY98). No Live Fire Testing occurred in FY99. The FY99 LFT&E activity included the assessment of the results of completed LFT, and the preparation of the Director's Live Fire Lethality Assessment.

TEST & EVALUATION ACTIVITY

The SLAM-ER operational test was adequate to assess the operational effectiveness and suitability of SLAM-ER. IOT&E was conducted from May 1998-May 1999. OT-IIA Phase I was conducted as combined DT/OT and three pre-production representative missiles were tested in captive carry mode and subsequently launched at threat representative targets. Phase I testing was conducted for risk reduction before proceeding to OPEVAL; specifically to assess the integration of SLAM-ER on the F/A-18 aircraft and to assess the performance of the SLAM-ER mission planning module on TAMPS. Applicable operational data from Phase I was combined with OT-IIA Phase II data to arrive at final operational test results.

OT-IIA Phase II (OPEVAL) was conducted from August 1998-May 1999 at NAWS China Lake and Point Mugu, CA, onboard USS ABRAHAM LINCOLN CVN 72, USS CONSTELLATION CV 64, and off the coast of Puerto Rico. Eight production representative missiles were launched in eleven attempts against threat representative targets in operationally realistic scenarios. One combined DT/OT shot from a previous test period was included bringing the total number of weapons fired to nine out of twelve attempts.

A separate live fire program using SLAM-ERs with live warheads began in 1996. DOT&E performed an independent LFT&E assessment on the lethality of the SLAM-ER/ WDU-40/B high-explosive warhead based on data obtained from the lethality tests.

TEST & EVALUATION ASSESSMENT

DOT&E monitored the operational testing of SLAM-ER and evaluated the test results. DOT&E does not concur with COMOPTEVFOR's assessment that SLAM-ER is operationally effective but not

operationally suitable. It is DOT&E's assessment that SLAM-ER was ***not operationally effective*** and ***not operationally suitable*** as tested.

DOT&E focused on the evaluation of specific effectiveness and suitability parameters, weapon system accuracy, IIR seeker and data link performance (communications), weapon effectiveness (damage to a specified target set), weapon system reliability, operational availability, and lethality.

DOT&E independently analyzed the test results addressing weapon system accuracy, IIR seeker and data link performance, weapon effectiveness, weapon system reliability, and operational availability. These areas were chosen because of their relative importance in determining operational effectiveness and operational suitability. Advertised limitations in test conduct did not appreciably affect our ability to assess SLAM-ER performance.

OPERATIONAL EFFECTIVENESS

SLAM-ER is not operationally effective as tested for the following reasons:

- The weapon did not meet the probability of missile success requirement nor the probability of mission success requirement. Only 5 of 11 missile launches (the 12th was a no test) were successful. Three missile shot attempts were airborne aborts for weapon failures scrubbing the mission or requiring the backup weapon to be used.

- It does not meet terminal accuracy requirements. The demonstrated circular error probable (CEP) radial miss distance is substantially larger than the SLAM-ER requirement.

- Failure by the manufacturer to boresight the weapon seeker introduced seeker drift errors into the test results. This has an operational impact because the aircrew will be required to spend more time "heads down" in the cockpit trying to acquire the target and once found, continually updating the aimpoint prior to weapon impact. This—combined with marginal cockpit video, video freezing, and multi-path interference—make the weapon very difficult to use even for the most experienced aircrew. In addition, one weapon– the no test–was inadvertently exposed to radio frequency interference, which suggests susceptibility to jamming of the data link.

Regarding lethality and based on overall Live Fire Test results, the SLAM-ER warhead is lethal when accurately delivered against operationally significant targets. The SLAM-ER warhead, when compared to its predecessor SLAM, shows mixed improvement in lethality. In its favor, SLAM-ER has double SLAM's penetration capability to attack hardened targets, and its two fuze delay times are twice and four times the SLAM's single delay, which defers SLAM-ER's detonation until the warhead has penetrated deeper within the target. Also, SLAM-ER's fragmentation lethal footprint against such soft targets as missile sites is slightly larger than SLAM. On the other hand, against such targets as buildings and ships that are killed by blast or overpressure, SLAM-ER is potentially less lethal than SLAM because it generates less blast. Nonetheless, SLAM-ER may have greater lethality against a multi-story building than SLAM because its longer fuze delays allow it to penetrate more deeply into the building before detonation, so less blast vents to the outside.

OPERATIONAL SUITABILITY

SLAM-ER was not operationally suitable as tested.

- The weapon failed to meet reliability criteria for mean time between operational mission failures.
- It did not meet the operational availability requirement.
- It did not meet the Built-In-Test false alarm and probability of correct detection requirements.

The cumulative operational impact of these deficiencies is a lack of confidence by the warfighter that a single weapon will kill a target. Multiple weapons will be assigned to destroy a target, either on one aircraft or several aircraft. The additive effect is more assets and time required to complete a specific task and more personnel and material at risk.

CONCLUSIONS, RECOMMENDATIONS, LESSONS LEARNED

The AGM-84H, the Standoff Land Attack Missile Expanded Response (SLAM-ER) OT&E was adequate to evaluate operational effectiveness, suitability, and lethality. Our assessment is that SLAM-ER is not operationally effective or operationally suitable as tested.

The Navy has embarked on a proactive program to correct deficiencies noted during OT to ensure an operationally effective and suitable system prior to fleet introduction. Current plans call for testing all of the fixes in a Verification of Correction of Deficiencies phase. Successful completion of this test phase is required prior to a Milestone III decision. We will report the results of future testing in a B-LRIP report to Congress.

Test Design, Conduct, Procedures and Equipment are deficient in several areas. Live fire of an all-up-round SLAM on an overland range cannot be conducted due to range safety constraints. Missiles must have self-destruct mechanisms included in the telemetry (TM) package installed in place of the warhead. As a result, end-to-end testing of overland warhead shots cannot be included in the test strategy. To capture end-to-end performance, testing is accomplished in segments. The results are then collated into a comprehensive evaluation combining the necessary elements of an operational flight. Live shots with TM packages that test launch, cruise, target acquisition, and accuracy are allied with warhead penetration and lethality analysis and testing conducted using the supersonic sled facility at NAWCWPN China Lake.

The LFT&E used a building block approach to construct a lethality assessment from a variety of technical tests. The lethality assessment would have been more compelling, however, and more in the spirit of LFT&E if there had been confirming end-to-end SLAM-ER attacks of actual threat-representative targets using warhead-equipped missiles. Future plans include a ship vulnerability test tentatively scheduled for the December 1999 timeframe. This test plans to use a SLAM-ER missile to help validate damage characterization models for both ships and missile warheads and observe and measure secondary effects resulting from fires from the missile impact/explosion.